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VOIP: THE REVOLUTION WITHIN THE CYBERSPACE WORLD

Presented by

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He currently serves as the chairman of the VoIP Committee of the American Bar Association—Section of Science and Technology Law. He also serves on the , International VoIP Task Force of the ABA Cyberspace Committee—Business Law Section, investigating regulatory models of VoIP in foreign jurisdictions. In addition, for the past two years, he has served as Chairman of the VoIP/Telecommunications Sub-Committee for the California State Bar Cyberspace Committee.

Mr. Trope has authored more than a dozen articles and presentations concerning VoIP and related Internet/e-commerce issues. He is currently writing the *VoIP Handbook*, to be published by the ABA Science & Technology Section.

A 1981 *cum laude* graduate of Pomona College, Mr. Trope attended UCLA School of Law where he was elected as an *Editorial Staff Member* of the **UCLA Law Review**. In addition, while at UCLA Law School, Mr. Trope served as the *Senior Articles Editor* of the **Century City Bar Association Journal**, and the *Associate Editor* of the **Beverly Hills Bar Association Journal**.

Upon graduation in 1985, Mr. Trope moved to Washington, D.C. to serve as law clerk to the Honorable H. Robert Mayer* of the United States Claims Court. Then Mr. Trope went on to serve as law clerk to the Honorable Wilson Cowen, Senior Circuit Judge of the United States Court of Appeals for the Federal Circuit.

In 1987, Mr. Trope joined the Washington, D.C. office of Finley, Kumble, Wagner, Heine, Unterberg, Manley & Casey where he worked in the business, intellectual property and litigation departments. In 1989, he joined the Washington, D.C. office of Foley & Lardner. In 1991, he moved back to Southern California where he founded Novo Law Group, with offices in Beverly Hills, Irvine, California, New York and Washington, D.C.

VoIP:

VOICE OVER INTERNET PROTOCOL

THE REVOLUTION WITHIN THE

CYBER-SPACE WORLD

[A CANDID COMPENDIUM]

Imagine a world in which, during a phone call with your mother, she instantly messages you her meatloaf recipe, which appears on your computer screen while the phone call takes place through your computer system. Alternatively, while at a party, you settle an argument about an all-time baseball record by calling a friend and having him download all the relevant statistics to everyone's cell phone containing a PDA, with the cellular phone call being transmitted via Internet. Imagine that with a single click you could clean the spam from your voicemail system, your text messenger pager, and your email inbox because they are all operated from the same user interface, namely, Voice over Internet Protocol (VoIP).

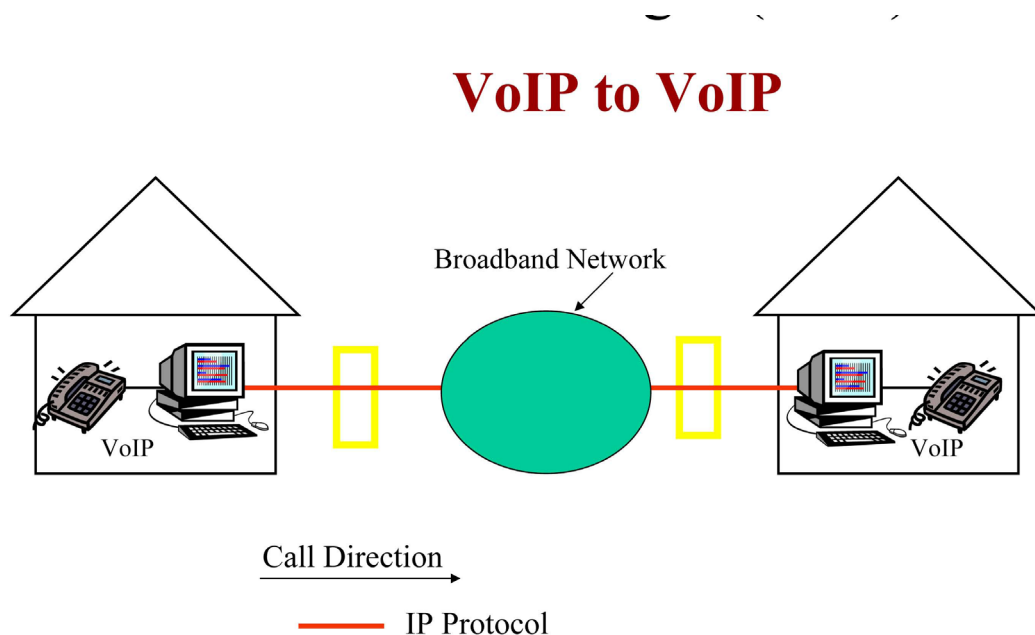
VoIP allows people to make phone calls through their computers by translating telecommunications into data packets for transmission over the Internet. This technology makes phone calls, faxes, and other communications far more efficient and cost-effective than traditional analog, circuit-switched technology. In this regard, VoIP data packets from

a given conversation can travel separately using the most optimal network routes, whereas analog calls require voice signals from each conversation to flow on a single circuit.

To clarify this point, imagine a six-lane highway representing the Internet, with vehicles representing data packets and exits representing beginning and ending points for communications. A traditional call requires blocking one entire lane between exits, whereas a VoIP call breaks up voice data into packets that can travel along any lane of the highway and be regrouped together at the exit. In this sense, VoIP optimizes the Internet by finding the fastest route for each packet and also by allowing simultaneous transmission in both directions of data and voice and pursuant to the software protocol of the Internet. Here are the three scenarios involving phone calls including VoIP:

1. **Pure VoIP:** A phone call between two users of VoIP technology in which the call involves using a microphone interfaced into a computer. The phone call then goes directly into the Internet through a broadband provider and is received at its final destination by a computer using an adapter for converting the voice packets into analog form and allowing the end user to hear the telephone call. This scenario can be seen at *Exhibit 1*.

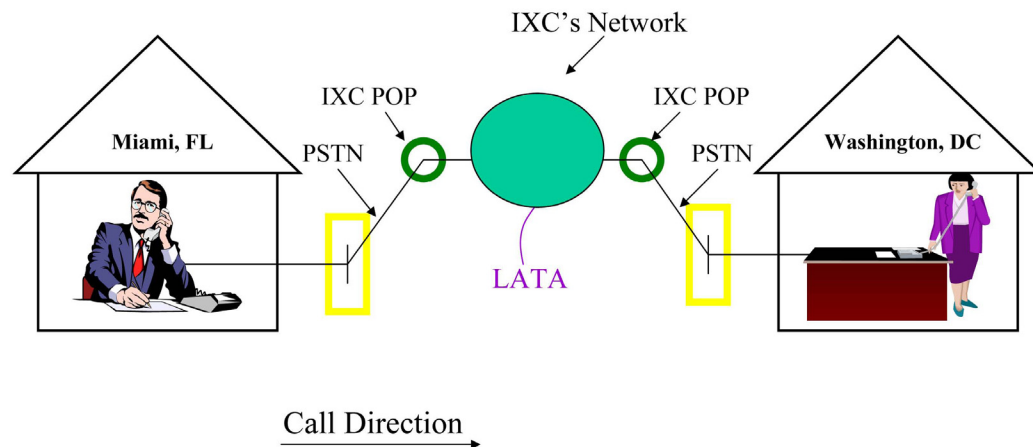
Exhibit 1



2. VoIP to POTS with Internet: In this scenario, the initiator of the phone call uses VoIP equipment attached to the computer with immediate Internet access through a broadband provider. The phone call emerges from the Internet, goes into the local exchange carrier system using PSTN (public switched telephone network) or POTS (plain old telephone service) technology (Note that the terms PSTN and POTS are interchangeable). The call is received by the end-user using PSTN/POTS equipment. This scenario is depicted in *Exhibit 2*.

Exhibit 2

POTS to POTS (VoIP as Transport)

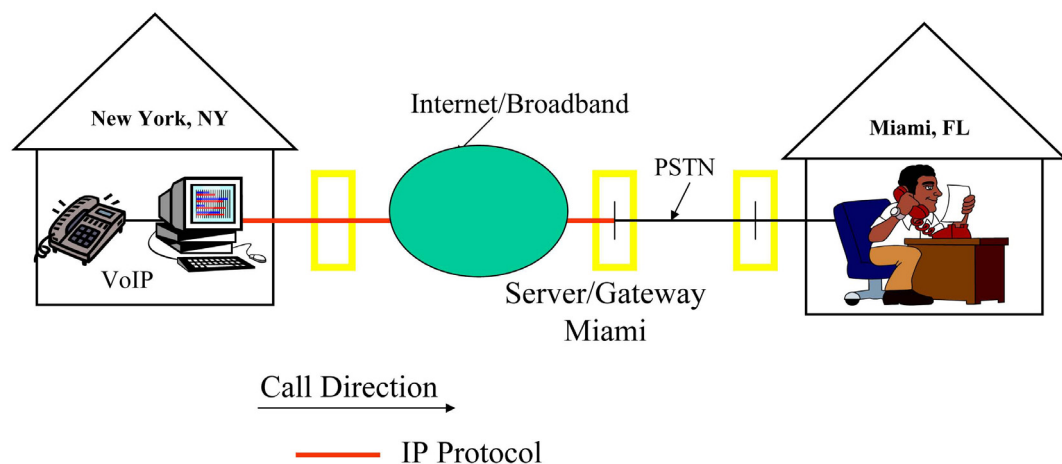


3. POTS to POTS (using VoIP or the Internet as Transport): This scenario reflects the ultimate hybrid situation in which many nationally recognized long distance carriers use the Internet for transmitting phone calls between local exchange carriers using PSTN/POTS technology. IXCs (otherwise known as Interexchange Carriers) receive the call from the local exchange carrier on the PSTN/POTS system of copper wire.

The call is then routed through the Interexchange Carrier's network, which typically involves use of the Internet. The phone call is then downloaded to its destination from the Internet into the PSTN/POTS system to a local exchange carrier and then to its final destination. *Exhibit 3* illustrates this VoIP scenario.

Exhibit 3

VoIP to POTS with Internet



IP in the Middle

With the POTS, data transmission via facsimile is unidirectional rather than bidirectional or multidirectional. This means that, while someone is sending, the other side is locked up and cannot transmit, resulting in slower data transmission or no transmission, since data re-routing is not automatically available as in the Internet context.

Voice transmissions through POTS are bidirectional, but the routing of the traditional telephone call is static or fixed, preventing automatic rerouting if a particular pathway is

blocked. Moreover, POTS does not allow for simultaneous transfer of data with voice transmission.

VoIP technology is more efficient by combining data and voice transmissions into one system that is connected to the Internet. In addition, VoIP service is currently free from most, if not all, state and federal taxes and tariffs that are typically imposed on POTS providers. This means that VoIP service is anywhere from 10 percent to 30 percent less expensive than traditional POTS service.

As with any new telecommunications technology, government regulation always becomes a question, especially when the telecommunications technology involves the Internet. The courts, Congress, the Department of Justice (DOJ), and the Federal Communications Commission (FCC) are still hashing out jurisdictional issues in the regulation of VoIP. Indeed, a number of governmental agencies have sought regulatory control over certain aspects of VoIP, including the DOJ, the Federal Bureau of Investigation (FBI), the Drug Enforcement Administration (DEA), and the Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF).

This past summer, Senator Inouye (D-Hawaii) and Senator Stevens (R-Alaska) introduced an alleged overhaul of the 1996 Telecommunications Act, this past summer. The release of this proposed legislation by the Senate Energy and Commerce Committee has touched off a massive lobbying effort by a number of constituencies, including companies that provide POTS services, Internet Service Providers (ISPs), consumer advocacy groups, and technology company's who seek expansion into the telecommunications market.

Some experts predict that VoIP use could increase from its 2005 level of 10 percent of consumer phone calls to 40 percent of consumer phone calls in the US market by 2008. Indeed, Internet telephony is giving traditional phone service a run for its money, and is expected to be used by 32.6 million US households in 2010, according to a survey released in July, 2006 by eMarketer. VoIP as an alternative to POTS or cellular phone service is definitely luring customers with low prices but that this is just one component in a \$300 billion dollar market for residential voice and data services.

That kind of growth can be viewed as a restructuring of the telecommunications infrastructure of the United States. Concomitantly, the various regulatory, executive, and judicial bodies of the government will become part of this revolutionizing of America's communications infrastructure.

Indeed, as both consumers and businesses move toward implementing VoIP technology, obviously POTS demand will drop, causing a disruption for those companies that provide POTS services and equipment. Since states rely on receiving taxes and tariffs from POTS to fund emergency services, such as 911, Universal Access, and telecommunication services for the hearing impaired or sight impaired, a significant shift to VoIP technology in which the imposition of such taxes and tariffs does not exist will

adversely impact the ability of the states to fund such services for these common carrier obligations.

Moreover, any new technology will have its detractors when it is implemented. Some consumer advocates have voiced concerns regarding whether VoIP has the quality and reliability to completely replace POTS services. Since VoIP represents the ultimate convergence of data and voice transmissions over the Internet, businesses implementing VoIP will face various regulatory and business record-keeping challenges with respect to email, voicemail, data storage retention and/or periodic destruction, span, and viruses. Attorneys advising clients concerning the implementation of a VoIP telecommunications system must carefully guide their clients through a maze of various criteria in determining:

1. Whether VoIP is appropriate for a particular client;
2. Issues of email and voicemail retention and/or periodic destruction;
3. Issues concerning interception of VoIP transmissions by law enforcement agencies;
4. Issues concerning spun insertions in VoIP transmissions;
5. Issues concerning the security of a VoIP system from private interception to the extent that the system employs wireless technology; and
6. Issues concerning the prevention of viruses.

This *candid compendium* will examine the regulatory debates surrounding the implementation of VoIP and its impact on the infrastructure of the United States so far as telecommunications and the Internet are concerned. It is hoped, but not guaranteed that this brief cyberspace interlude will provide a jumping off point for additional investigation so as to enable an attorney to provide basic advice regarding this revolutionary technology.

In order to fully understand VoIP's impact on the Internet, this article will first provide a brief history of the development of the Internet. In addition, the article will offer an analysis of the relevant portions of the Telecommunications Act in. 1996, from which most of the regulatory debate surrounding VoIP originates.

How the Internet Operates

The Internet is a vast network of individual computers and computer networks that communicate with each other using the same communications language, Transmission Control Protocol/Internet Protocol (TCP/IP).The Internet consists of approximately more than 100 million computers around the world using TCP/IP protocols.¹

Along with the development of TCP/IP, the open network architecture of the Internet has the following characteristics or parameters:

1. Each distinct network stands on its own with its own specific environment and user requirements, notwithstanding the use of TCP/IP to connect to other parts of the Internet. Communications are not directed in a unilateral fashion. Rather, communications are routed throughout the Internet on a best efforts basis in which some packets of information may go through one series of computer networks and other packets of information go through a different permutation or combination of computer networks, with all of these information packets eventually arriving at their intended destination.

2. Black boxes, for lack of a better term, connect the various networks; these boxes are called "gateways" and "routers." The gateways and routers do not retain information but merely provide access and flow for the packets being transmitted.

3. There is no global control of the Internet.

With TCP/IP as the common language of the Internet, any type of computer can communicate with any other type of computer on the Internet, whether the computer is a PC running the Unix Operating System, a Macintosh or Apple computer, or a PC using DOS/Windows. TCP/IP is also the leveling force of the Internet. It is irrelevant whether a computer is connected to the Internet via a modem or networked with hundreds of other computers in a corporation. Every computer accessing the Internet uses the same TCP/IP protocol to communicate.

The Development of the Internet

The Internet evolved from a US Department of Defense project designed to protect computer communications in the event of a catastrophe such as a nuclear attack, earthquake, or flood. The predecessor of the Internet was known as the Advanced Research Projects Agency Network (ARPANET). ARPANET was developed with the premise of continuing to operate even if some computers or connections on the network were lost or destroyed. Thus, ARPANET's functioning did not hinge on the continued operation of any one computer since there was no central location. ARPANET consisted of computers all using the TCP/IP protocol to address and send messages to each other.

The Internet developed in the 1970s as ARPANET expanded its member computers and networks to include radio and satellite networks. Consequently, ARPANET morphed or evolved into the Internet as scientists, universities, and businesses began using the TCP/IP protocols for communication. Indeed, the availability of email communication and file transfers truly sparked the explosive growth of the Internet in the 1980s and 1990s.

The World Wide Web is an outgrowth of the development of the Internet, taking shape in the early 1990s.² The Internet encompasses almost all types of electronic communications, such as emails, file transfers, and more recently voice communications, between computers using TCP/IP protocol. The World Wide Web is a part of the Internet that uses hypertext markup language (HTML) as well as extensible markup language (XML) to link together files containing text, graphics, audio and video clips, and databases. The Internet's growth in the 1990s and beyond is directly linked to the growth of the World

Wide Web as businesses, large and small, at home or in industrial/commercial locations, discovered the marketing advantages of Web sites involving point and click tools for accessing information no matter where the documents were physically located.

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In essence, the Internet, as well as the World Wide Web, represents the realization of a theory in which communications travel via packets rather than circuits. In contrast, POTS functions on circuit switches that are slow, cumbersome, and inadequate for the high-speed communications involved with computers. Thus, the concept of packet switching has in essence become the foundation of the Internet and the World Wide Web.

The TCP/IP protocol allows the various communication packets to be routed automatically through different sections of the Internet simultaneously. To the extent that any one particular route appears blocked or unavailable, the transmission is then automatically rerouted through a different part of the Internet. Thus, Internet communications are exponentially faster because packet switching is electronic; Internet communications do not require a mechanical relay or switching system. Also, Internet communications are often more reliable in terms of the frequency of attempted communications being completed. If someone experiences difficulty in completing an Internet communication, it may have to do more with demand exceeding network or Internet capacity at a particular given moment than with a particular route being blocked.

The other extremely important characteristic of the Internet is its ownership and control. No one owns the

Internet; no government agency or business enterprise controls the Internet. Various computer networks that belong to the Internet are proprietary in nature. Thus, the Internet represents, along with the World Wide Web, an electronic mosaic of a free market economy. The Internet and, to a large extent, the World Wide Web have no entrance fee or barrier other than the requirement that communication take place using the TCP/IP system.

Many individuals and businesses even today use POTS with a modem to dial in to an Internet Service Provider (ISP), which functions as a gateway to the Internet, and perhaps might even be more appropriately called an Internet Access Provider (IAP). Once the POTS link is made between, for example, a single desktop computer with a modem to the IAP, the IAP then converts the communication taking place into informational packets and puts them into the Internet, which uses radio transmissions, dedicated cable line systems, and interconnections with larger computer networks that also provide transmission services to customers of an IAP.

Thus, many consumers and businesses accessing the Internet face economic costs at two points: (1) the cost for monthly POTS, whether residential or commercial; and (2) access charges to the Internet imposed by the IAP.

Initially, ARPANET functioned over high-capacity transmission lines linking its original four-member nodes, UCLA, University of California at Santa Barbara, Stanford Research Institute, and University of Utah. Eventually, the National Science Foundation funded the installation of additional high-speed, high-capacity lines that became known as the Internet backbone.

Today, other countries, such as Canada, Japan, and many European countries, have their own Internet backbones. There are even privately owned commercial Internet backbones especially created for the purpose of carrying business traffic. Indeed, the US Congress' funding of \$2 billion to the National Research and Education Network for the upgrade of the Internet backbone enabled the spread of the Internet in the 1990s and its subsequent commercialization.

Thus, Internet speed has increased by more than 50 times since 1991, allowing electronic transfer of the entire Encyclopedia Britannica in one second. Today, with the advent of the World Wide Web, computer networks worldwide feature 3D animated graphics, radio, and cellular phone links to portable computers, as well as fax, voice, and high-definition television.

Current State of Internet Connectivity

Web addresses known as Uniform Resource Locators (URLs) allow an Internet browser to stop along the way and investigate the data contained at a particular Web site. Most Web documents contain links, which are short sections of text or image that refer to another document. Many organizations now have homepages, providing a series of links to other documents or databases relevant to that organization.

Thus, the World Wide Web has grown into the global free market through interfaces and services enabling online shopping, continuously updated news information, interactive games, and online data research.

Internet users can access search engines or browsers such as Yahoo, Lycos, and Magellan to search for particular information on the public sites that are part of the Web. To the extent that proprietary Web sites wish to obtain subscribers, Internet users can be routed through advertising links or searches to these sites and can access them for a fee.

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As mentioned previously, the POTS system is merely an access pathway to the Internet. True Internet connectivity is said to occur once the user's communications leave the POTS network system and travel via speed transmission lines belonging to various networks on the Internet.

Some of these dedicated high-speed lines can include fiber optic cable lines, in which the electronic packets or transmissions are converted into packets of light

transmitted over the fiber optic cables, then reconverted into electronic pulses or packets, and then reconverted again if necessary to reach the final destination, which may require local access through the POTS system.

This is an important distinction to keep in mind. Much of the federal regulatory framework focuses on the existence and access to the POTS network. Indeed, it is the POTS network paradigm of regulation that serves, fortunately or unfortunately depending on one's point of view, as the basis from which discussion develops surrounding regulation of electronic transmissions taking place through the Internet.

As part of the infrastructure of the Internet allowing for the exponentially fast electronic transmission, residential high-speed or broadband Internet service was introduced in the late 1990s, allowing residential receipt and transmission of audio and video. As such, it has been called "The Holy Grail of Media Companies." Currently, there are two principal pipelines through which consumers can receive broadband access: digital subscriber lines (DSL) and cable lines.

DSL uses the same copper wires as POTS in providing telephone service and dial-up access. DSL allows the transmission of data at high speed over a conventional copper wire. DSL lines can carry both ordinary telephone services and high-speed data transmission.

The carrier providing this service separates the ordinary voice call to the POTS network, and the data traffic is routed to a packet-switched data network (in essence compressing the data and sending it in split-second bursts during gaps on the dedicated data copper wire, where it has been routed to an ISP).

In contrast, cable modem service uses the network of coaxial cable employed to transmit television signals. Because the copper wire services used for telephone service and coaxial cable used for television are already installed in most American homes, television and cable companies compete with one another to deploy broadband Internet services.

The difference between cable modem services versus digital subscriber service is that DSL service still uses the slower speed transmission properties of copper wire of the local POTS network. With DSL, two DSL modems are attached to a telephone loop, one at the subscriber's premises and one at the telephone company's central office. Indeed, one of the advantages of DSL service is that there is no need for a dedicated phone line for Internet access.

Both phone line transmission and high-speed data transmission are put through the modem over the copper wire cable to the local telephone company's processing office using a digital subscriber line access multiplexer. With this device, the carrier sends ordinary calls to the circuit switched telephone network and data or non-voice data traffic to a packet switched data network that compresses data and can send it in split-second bursts during gaps on a particular copper line.

While DSL has a typical top speed of 1.5 megabits per second (mbps) over a copper-based system, Internet communications through a fiber optic network can be transmitted at a rate of 5 megabits per second, over three times as fast as the DSL system. Verizon claims that it now can offer not only regular fiber optic Internet connectivity at 5 mbps, but also will be offering higher priced connections at 15 mbps and 30 mbps.

With DSL, multiple ISPs may compete for a particular user's subscription over the same DSL pipeline. On the other hand, most cable operators either provide Internet service themselves or provide the service in connection with a specific ISP created and owned by the cable operator. Therefore, cable-owned or cable-affiliated ISPs, unlike most dial-up and many DSL ISPs, essentially own the "last mile;" connection between the local distribution point and the subscriber's home.

This allows the cable operator to prevent another ISP's access to a particular cable subscriber. In contrast, the last mile with DSL is owned by the particular local area POTS provider.

Growth of the Internet

No one doubts the explosive growth of the Internet. Within the United States, as of January 1996, there were approximately 200,000 registered domain names; as of April 2001, less than four and a half years later, there were 31 million registered domain names within the United States.

Between 1997 and 1998, the number of ISPs in North America alone grew from 3,700 to 4,800. As of 1998, ISPs were providing services to more than 20 million households in the United States. Some people estimate that the Internet, depending on how one measures growth, is growing at a rate of 20 percent a month. As of 1998, according to a study published by the Information Infrastructure Task Force, a task force funded by the US government, Internet use was estimated at 50 million people. Obviously, since then that number has doubled, if not tripled.

U.S. Government Regulation of Telecommunications and the Internet

Telecommunication Service vs. Information Service

Much of the regulatory framework governing the Internet as far as telephone and related service is concerned can be traced to the 1996 Telecommunications Act and the various regulations and rules promulgated by the FCC. Congress passed the

Telecommunications Act of 1996 as a way to create a "pro-competitive, deregulatory national policy framework" with the intent of promoting the "deployment of advanced telecommunication and information technologies to all Americans by opening all telecommunication markets to competition."

The two main definitions in the 1996 Act are the definitions for "telecommunication services" and "information services." The 1996 Act defines "telecommunication service" as "the offering of telecommunications for a fee directly to the public, or to such classes of users as to be effectively available directly to the public, regardless of the facilities used."⁴

In contrast, an "information service" is defined as "the offering of a capability for generating, acquiring, storing, transforming, processing, retrieving, utilizing or making available information via telecommunications, and includes electronic publishing, but does not include any use of any such capability for the management, control, or operation of a telecommunication system or the management of a telecommunications service."⁵

As part of the 1996 Act, all POTS providers are obligated to provide what are termed "common carrier obligations," including such services as 911 emergency calling, Universal Access (in which a charge is assessed to each subscriber for a state fund that subsidizes the deployment of POTS systems in low population areas in which the free market would not otherwise provide such services because it is not cost effective), and telephone transmission services for the hearing or sight impaired.

State, local, and federal taxes and tariffs that typically appear on the monthly invoice for POTS service funded these mandated common carrier obligations. Therefore, to the extent that Internet access originates through the POTS system, such access is subject to regulation and the imposition of taxes and tariffs pursuant to the 1996 Telecommunications Act.

Furthermore, under the 1996 Act, local POTS providers are required to provide access to their local networks to competitors at a wholesale price when such competitors are providing basic telecommunication services as opposed to enhanced information services. In other words, the law imposes common carrier obligations on providers of telecommunication services but not on providers of information services.

The underlying premise for these distinctions was that basic telecommunication services should be provided on a universal basis to every household. The pricing of the services to commercial enterprises is typically more expensive; the tariffs and access fees imposed on businesses to some extent subsidize POTS services to residential communities.

On the other hand, enhanced information services were considered to be an area in which less regulation would be imposed so as to promote the growth and development of the information superhighway. Leaving aside such issues as trademark, copyright, and other rights in content, the Internet itself has developed mostly without regulation,

notwithstanding that government agencies such as the Department of Defense and the National Science Foundation have funded its development to a large extent.

When Congress passed the 1996 Telecommunications Act, however, definitions in the Act could not anticipate the development of new technologies, especially in such a short period of time following its enactment. Obviously, the enactment of the 1996 Telecommunications Act did not envision broadband Internet technologies and therefore did not address the question of whether broadband Internet technologies (DSL, cable modem, fiber optic cable) qualify as telecommunication services, information services, or a combination thereof.

Cable Modem and Brand X

In order to address the challenge of properly classified Internet access through the broadband service of cable modem, the FCC issued a declaratory ruling in 2002 in which it declared that broadband access through cable modem was an interstate information service, not a cable service, and that there was no separate offering of telecommunications service.

By this ruling, Internet access provided by cable modem was therefore subject to the lowest classification of regulation under the Telecommunications Act. As an information service only, a cable modem operator would not be subject to the common carrier obligations such as 911 emergency services, Universal Access, service charges or access for the hearing or sight impaired. Moreover, absent these common carrier obligations, the ruling implied that cable modem providers would therefore be free from the various tariffs and taxes imposed by federal, state, and local governments, including local governments' taxing authority over cable television.

Numerous entities challenged the FCC's declaratory ruling concerning cable broadband service. In particular, Brand X Internet Services, EarthLink, the State of California and the Consumer Federation of America all specifically petitioned the Third, Ninth, and District of Columbia Circuits claiming that the FCC should have made a rule that recognized the complexities of cable modem service and that declared it to be both an information service and a telecommunication service.

Such a hybrid ruling would subject cable modem service to regulations involving common carrier obligations. Moreover, with such a hybrid classification, cable broadband providers would be required to open their lines up to competing ISPs. Eventually, the cases were all consolidated before the Ninth Circuit.

In a decision issued on October 6, 2003, the Ninth Circuit sided with Brand X Internet Services, EarthLink, the State of California, and the Consumer Federation of America and held that cable modem operators should be classified as offering telecommunication services as well as informational services. In so holding, the court noted that cable broadband service consists of two elements:

1. A "pipeline" consisting of coaxial cable lines instead of traditional POTS copper wire lines and the Internet service transmitted through this pipeline; and

2. Unlike traditional ISPs, the cable broadband provider controls all the transmission lines between its subscribers and the Internet.

Thus, in the opinion of the Ninth Circuit, to the extent that a cable broadband provider functioned as a conventional ISP, it fell squarely and neatly within the 1996 Telecommunications Act definition of an information service. On the other hand, to the extent that a cable operator provided a subscriber's Internet transmission as opposed to merely Internet access over its cable broadband facilities, it was providing a telecommunications service as defined in the Communications Act.

In the concurring opinion by Circuit Judge O'Scannlain in *Brand X*, he stated that, "[r]egardless of one's view of the wisdom of the FCC's Declaratory Ruling, it could not be denied that our holding today effectively stops a vitally important policy debate in its tracks, at least until the Supreme Court reverses us or Congress decides to act." Furthermore, Circuit Judge O'Scannlain noted that this "decision could suffer a third, decidedly more drastic fate. . . . [The FCC] [could adopt] a policy of non-acquiescence in the face of a court ruling with which the agency disagrees."

The Chairman of the FCC at the time, Michael Powell, stated that he considered this decision to be the greatest threat to the development and innovation within the Internet technologies as well as to the deployment of VoIP. The FCC appealed the ruling to the Supreme Court; the Supreme Court's decision will be discussed in the next section.

Around the same time, VoIP service provider Vonage found itself at odds with the Minnesota Public Utilities Commission (MPUC), which maintained that Vonage must comply with state laws regarding telephone companies. In 2003, Vonage sought relief from a federal district court of an MPUC order that Vonage comply with these state telecommunications laws. About a week after the Ninth Circuit rendered its *Brand X* decision, the Minnesota district court declared Vonage to be an "information service" instead of a "telecommunications service" and awarded it injunctive relief.⁸

Vonage simultaneously sought relief of the MPUC order from the FCC by filing a petition seeking federal preemption of the MPUC order. The FCC found that the company's Digital Voice service could not practically be separated into intrastate and interstate components, precluding dual state and federal regulatory regimes.⁹

The FCC noted that Digital Voice customers could use their phones from a broadband connection anywhere in the world, making it difficult to determine whether a call is local, interstate, or international in nature. The FCC also found that the regulations that would have been imposed by the MPUC were inconsistent with the FCC's deregulatory policies and that preemption was consistent with federal law and policies intended to promote the continued development of the Internet, broadband, and interactive services.

In its June 27, 2005, ruling, the Supreme Court held true to its statistical tradition and overturned the Ninth Circuit's holding of cable broadband as a telecommunications service.

Although the MPUC had appealed the district court's adverse ruling to the Eighth Circuit in *Nonage Holdings Corp. v. Minnesota Public Utilities Commission*, by the time the Eighth Circuit could rule, the FCC had issued its declaratory ruling. Accordingly, the Eighth Circuit held that the FCC order was binding on the court and thus affirmed the district court decision on the basis of the FCC order.¹⁰

The Supreme Court Rules in Brand X

Many veteran court watchers predicted that, in the *Brand X* case, the Supreme Court would issue a rare affirmation of the Ninth Circuit, a circuit renowned for having the highest reversal rate among the 13 federal judicial circuits. During the March 29, 2005, oral arguments, Justice Antonin Scalia compared the cable industry's argument in the case to an automobile parts vendor who requires customers to purchase car windshields when they want to buy windshield wipers.

Justice Stephen Brayer compared cable modem service to voice mail, which offers similar functionality to email but is associated with a highly regulated telecommunication service. "I keep thinking of my answering machine and it doesn't seem that much different," Brayer said.

Indeed, such questioning led many to believe that the FCC's hands-off policy toward Internet regulation would be unequivocally rejected. In its June 27, 2005, ruling, however, the Supreme Court held true to its statistical tradition and overturned the Ninth Circuit's holding of cable broadband as a telecommunications service.

In its decision, the Supreme Court first explained that prior case law required a federal court to defer to an agency's construction, even if it differs from what the court believes to be the best interpretation, provided that the particular statute is within the agency's jurisdiction to administer, the statute is ambiguous on the point at issue, and the agency's construction is reasonable.

The Court then held that the FCC's construction of § 153(46)'s "telecommunications service" definition was a permissible reading of the Communications Act. It explained that, for the FCC, the question whether cable companies providing cable modem service "offe[r] telecommunications within § 153(46)'s meaning" turned on the nature of the functions offered to the end user.

Seen from the consumer's point of view, the FCC had concluded, the cable wire was used to access the World Wide Web and newsgroups, for example, rather than transparently to transmit and receive ordinary language messages without computer processing or storage of the message. The integrated character of this offering had led the FCC to conclude that cable companies did not make a standalone, transparent offering of telecommunications.

This construction would not leave all information service offerings unregulated under the Telecommunications Act, the Court stated. It was plain, for example, that a local telephone company could not escape regulation by packaging its telephone service with voice mail because such packaging offers a transparent transmission path—telephone service—that transmits information independent of the information storage capabilities voice mail provides.

By contrast, the high-speed transmission used to provide cable modem service is a functionally integrated component of Internet service because it transmits data only in connection with the further processing of information and is necessary to provide such service. The FCC's construction therefore was more limited than respondents had assumed.

Respondents' argument that cable modem service did, in fact, provide transparent transmission from the consumer's perspective was also mistaken, the Court held. Their characterization of the "information service" offering of Internet access as consisting only of access to a cable company's email service, its Web page, and the ability it provides to create a personal Web page conflicted with the FCC's reasonable understanding of the nature of Internet service.

When an end user accesses a third-party's Web site, the FCC had concluded, he is equally using the information service provided by the cable company as when he accesses that company's own Web site, its email service, or his personal Web page. The Court pointed out that, as the FCC had recognized, the service that Internet access providers offer the public is Internet access, not a transparent ability (from the end user's perspective) to transmit information.

The Court also rejected respondent MCI, Inc.'s argument that the FCC's treatment of cable modem service was inconsistent with its treatment of DSL service and was therefore an arbitrary and capricious deviation from agency policy under the Administrative Procedure Act.

The Court found that the FCC had provided a reasoned explanation for this decision. The traditional reason for its common-carrier treatment of facilities-based carriers was that the telephone network was the primary, if not the exclusive, means through which information service providers could gain access to their customers. The FCC applied the same treatment to DSL service based on that history, rather than on an analysis of contemporaneous market conditions.

The FCC's declaratory ruling, by contrast, had concluded that changed market conditions warranted different treatment of cable modem service. Unlike at the time of the DSL order, substitute forms of Internet transmission exist today, including wire line, cable, terrestrial wireless, and satellite. The FCC therefore concluded that broadband services should exist in a minimal regulatory environment that promotes investment and innovation in a competitive market. There is nothing arbitrary or capricious about applying a fresh analysis to the cable industry, the Court reasoned.

In sum, the Supreme Court held that the FCC's conclusion that broadband cable modem companies were exempt from mandatory common-carrier regulations was a lawful construction of the Communications Act under prior case law and the Administrative Procedure Act.

Reaction to the Supreme Court's decision was mixed, depending on the party. The ruling was a great victory for the FCC, affirming the FCC's own ruling. Cable companies were delighted that they would not be forced to share their cable lines with other ISPs under common carrier regulations. Even telephone services companies were left hopeful for further deregulation of telephone companies.

On the other hand, ISPs were disappointed that cable companies could deny them access to cable lines. In addition, cable companies could potentially deny VoIP providers access to the cable lines.

The FCC's Efforts to Regulate

In addition to the FCC's rulings discussed above, in February 2004, the FCC declared that the VoIP service Free World Dial-Up was an information service because subscribers to the service could only make calls to other members of the service using VoIP technology.¹¹ The service itself was free and, as seen in Exhibit 1, is a pure VoIP system, avoiding any involvement of the POTS network.

Also in 2004, the FCC denied AT&T's petition for relief from common carrier obligations or classification as a telecommunications service to the extent that it transmits calls over the Internet.¹² The FCC refused to release AT&T from its common carrier obligations, notwithstanding the hybrid nature of AT&T's services.

The FCC's order stated: "We find AT&T's specific service, which an end-user customer originates by placing a call using a traditional touch-tone telephone with 1+ dialing, utilizes AT&T's Internet backbone for IP transport, and is converted back from IP format before being terminated at a LEC switch, is a telecommunications service and is subject to section 69.5(b) of the Commission's rules."

Then in March 2004, several federal law enforcement agencies requested that the FCC authorize the wire tapping of VoIP communications and require VoIP providers to make their telecommunications networks compliant or accessible to interception efforts by these agencies.

Law Enforcement Wire Tapping

With the advent of the Internet, and especially the growth in broadband access to the Internet through cable modem or DSL, law enforcement agencies such as the DOJ, FBI, DEA, and the Bureau of Alcohol, Tobacco and Firearms (ATF) have all expressed the need to combat crime and especially terrorism by having wire tapping authority over the Internet.

Supreme Court held that the FCC's conclusion that broadband cable modem companies were exempt from mandatory common-carrier regulations was a lawful construction of the Communications Act.

The Omnibus Crime Control and Safe Streets Act of 1968¹³ (Omnibus Crime Act) authorizes government interception of electronic verbal communications. The statute includes not only the basic prohibitions against individual wire tapping or interception of aural communications but also the authority allowing law enforcement agencies to intercept such communications.

The Omnibus Crime Act did not impose any requirement on the telecommunications manufacturers to make any particular telecommunication system receptive to interception by law enforcement agencies, however. Therefore, it was left up to the law enforcement agencies to develop their own technology for engaging in these interceptions.

During the Clinton administration, however, Congress passed the Communications Assistance for Law Enforcement Act (CALEA).¹⁴ CALEA sought to enable electronic surveillance by law enforcement agencies, regardless of whether communications were face to face or by electronic means, by mandating that telecommunications providers make their equipment (including hardware and software) capable of interfacing with government equipment used for communication interception. In other words, CALEA imposed an affirmative duty on providers of POTS services to conform their equipment to the telecommunication interception requirements as set by federal, state, and local law enforcement officials.

Under the Omnibus Crime Act and CALEA, conversations are the only communications that can be intercepted. Documents transmitted via facsimile over POTS lines are not open to interception, as such interception invades the province of the Fourth Amendment against unreasonable search and seizure. Law enforcement would need a separate court order to intercept such conversations.

In July 2003, the federal law enforcement agencies began lobbying the FCC to expand the reach of CALEA to conversations or transmissions taking place over the Internet. In March 2004, these governmental entities filed a 100-page joint petition for expedited rulemaking, asking the FCC to declare that CALEA covers broadband Internet access services and VoIP services.¹⁵

Issues Surrounding the Application of CALEA to VoIP

Applying CALEA to VoIP raises issues both numerous and voluminous. The federal government, particularly the DOJ, has been most vocal in asserting the need for expansion of CALEA to VoIP communications in order to combat all crime, especially terrorism in the wake of the 9/11 attacks. Indeed, there is great concern by federal law enforcement agencies that VoIP technology will become the new secret haven for terrorist cells operating both outside and within the United States.

At the same time, there are practical difficulties in applying the law to VoIP. The success of wire tap interceptions of VoIP communications is likely to be more muted because the detection itself is more limited; with an interception of a VoIP communication, for example, it is impossible to ascertain the location of the sender. Up until the introduction of VoIP technology, wire tap interception yielded not only the content of the communication but also the locations of the sender and the receiver of the communications.

Because POTS systems are static lines, discovering the locations of the participants was an additional bonus of information achieved through the communication interception. Even cellular phones, which are subject to CALEA, provide law enforcement agencies with an ability to generally locate the user of the cell phone as the user moves from cell site to cell site.

With VoIP, however, an individual can take a laptop with the appropriate VoIP hardware and software and move anywhere in the country or the world and current interception technology cannot locate the origin of the telephone call. A telephone call made in a pure VoIP scenario circumvents the POTS system. Therefore, the originator of the phone call can move great distances and law enforcement agencies are currently helpless to identify the caller's location.

Once the phone conversation is in the Internet system, the conversation or even a single sentence will be broken up into discrete packets. No two packets need necessarily follow the same route through the Internet to reach their final destination. Therefore, tracing the call back to a particular location is basically impossible.

The other potential problem with the application of CALEA to VoIP, however, is that it poses a number of threats to privacy interests. Businesses and privacy advocates alike have expressed concerns regarding such an application.

First, since VoIP technology represents the convergence of data and voice transmission, the law enforcement agencies will be faced with the inevitable interception and disclosure of businesses' and individuals' private information, which is subject to Fourth Amendment protection; the disclosure of this information would not be authorized under a plain reading of the Omnibus Crime Act or under CALEA. This means that, if a fax transmission is taking place through VoIP, otherwise known as Fax over Internet Protocol (FoIP), along with a phone conversation, any interception by the law enforcement agency is bound to scoop into its net both the oral conversation as well as the document being transmitted.

Second, transmission over the Internet takes place in discrete packets, with each packet having a particular address. Therefore, depending on where a law enforcement agency decides to initiate its interception, such an interception will undoubtedly gather more than just a particular phone call between two individuals. Law enforcement agencies are likely to intercept not only the conversation for which the court order applies but also

data transmissions and conversations of other parties who probably have no bearing or relationship to the investigation being conducted.

For instance, imagine a VoIP or broadband interception established by a law enforcement agency right at the hub of a major stock brokerage firm that seeks to determine whether a particular broker may be engaged in securities fraud. Unfortunately, given the law enforcement agency's equipment and just the nature of Internet transmissions through broadband, the interception is likely to contain far more than just conversations of the securities broker under investigation.

The broker's coworkers who are also making telephone calls through VoIP will inevitably be gathered into the interception, thereby violating the privacy of these other individuals who may have nothing to do with the subject of the investigation.

Law enforcement agencies counter that law enforcement and security needs currently outweigh these inadvertent privacy intrusions and promise that technological developments will eventually allow for proper filtering of target communications from inadvertent interceptions. There is no indication as to when such technology may become available, however.

Moreover, many of the innovators of VoIP services, in particular smaller companies such as Vonage and 8x8, have stated that the development and deployment of their respective VoIP systems did not anticipate CALEA compliance. Consequently, these smaller companies that are viewed as pioneers in the development and deployment of VoIP services are now facing significant cost increases. These cost increases may erode much of the cost savings that subscribers have been enjoying by switching from POTS systems to VoIP systems.

Large telecommunications entities such as AT&T and Verizon received direct grants from Congress in order to make their phone systems CALEA compliant. It may be that in order to have the level playing field that is promised by the FCC these smaller VoIP companies should receive similar financial assistance.

The FCC Applies CALEA to VoIP

The FCC settled many of these issues on September 23, 2005, when it issued its First Report and Order¹⁶ in response to the 100-page joint petition of the DOJ, FBI, and DEA. In the order, the FCC concluded that CALEA applied to facilities-based broadband Internet access providers and providers of interconnected VoIP service. The FCC called its decision "the first critical step to apply CALEA obligations to new technologies and services that are increasingly relied upon by the American public to meet their communications needs."¹⁷

The order first noted that it was applying CALEA to VoIP and broadband Internet access services under § 102(8)(B)(ii), a provision of CALEA on which the FCC had never relied previously. This particular provision, the Substantial Replacement Provision (SRP),

required that the FCC deem certain service providers to be telecommunication carriers for CALEA purposes even when those providers were not telecommunications carriers under the Communications Act of 1934.¹⁸ In other words, the FCC found that Congress intended the scope of CALEA's definition of "telecommunications carrier" to be more inclusive than that of the Communications Act.¹⁹ The FCC also found that classification of a service as an "information service" under the Communications Act did not necessarily compel a finding that the service fell within CALEA's exclusion for information services.²⁰

The FCC then found that facilities-based providers of any type of broadband Internet access service, including wireline, cable modem, satellite, wireless, fixed wireless, and broadband access via power line, were subject to CALEA.²¹ The FCC explained that facilities-based broadband Internet access providers satisfy each of the three prongs of the SRP: (1) they are providing a switching or transmission functionality; (2) this functionality is a replacement for a substantial portion of the local telephone exchange service, specifically, the portion used for dial-up Internet access; and (3) public interest factors weigh in favor of subjecting broadband Internet access services to CALEA.²²

Similarly, the FCC found that CALEA applied to providers of "interconnected VoIP services." The FCC defined VoIP services to include those that: (1) enable real-time, two-way voice communications; (2) require a broadband connection from the user's location; (3) require IP-compatible customer premises equipment; and (4) permit users to receive calls from and terminate calls to the POTS. The FCC clarified that a service constituted an interconnected VoIP if it offered the capability for users to receive calls from and terminate calls to the POTS; CALEA covered the service offering for all VoIP communications, even those that do not involve the POTS.²³

The FCC reasoned that providers of interconnected VoIP satisfy the three prongs of the SRP under CALEA's definition of "telecommunications carrier." First, these providers are "engaged in providing wire or electronic communication switching or transmission services."²⁴ Second, interconnected VoIP satisfies the "replacement for a substantial portion of the local telephone exchange service" prong of the SRP because it replaces the legacy POTS service functionality of traditional local telephone exchange service.²⁵ Finally, the FCC found that the public interest weighed in favor of its conclusion as well ²⁶

To give providers a reasonable time to comply with its order, the FCC established a deadline of 18 months from the order's effective date.²⁷ The FCC stated that, "in the coming months," it would release another order to address separate questions regarding the assistance capabilities required of the providers covered by this order. The subsequent order would address other important issues under CALEA, such as compliance extensions and exemptions, cost recovery, identification of future services and entities subject to CALEA, and enforcement.

Security Risks Associated with VoIP

Despite the FCC's ordering of CALEA compliance by March 29, 2007, many industry experts, including Jeff Pulver of Free World Dial-Up, concede that the technology for such

compliance is "years down the road." The same technology that would enable law enforcement officials to single out a particular VoIP transmission and its source within the Internet would also enable identification and isolation of computer generated virus attacks and other intrusions into confidential data records.

The inability to isolate or separate out one transmission among the millions of randomly traveling information packets is the key obstacle. The random and chaotic nature of Internet transmissions is what enables hackers and other cyber terrorists to launch their attacks on databases and Internet networks without identity or location detection.

Moreover, with the convergence of data and voice transmissions into one platform, security breaches or successful cyber attacks will be twice as dangerous. A security breach in either the data sector or voice segment will compromise an entire network if that network is VoIP based. The convenience of PC-based phones straddling both services also increases its vulnerability in the absence of CALEA-type technology.²⁸

The challenge will be to design interim solutions such as firewalls designed for VoIP traffic. In addition, security patches and upgrades should be disallowing vulnerable or unstable Internet Protocols at voice gateways, which interface with the POTS.²⁹

Enhanced 911 Service

On May 19, 2005, the FCC issued an order requiring VoIP providers to supply adequate 911 emergency call service.³⁰ The FCC ordered that VoIP providers supply "enhanced 9-1-1" (E9-1-1) emergency calling capabilities to their customers as a mandatory feature of the service. "Basic 911" service refers to a forwarding arrangement in which calls dialed to 911 are transmitted from the service provider's switch to a single geographically appropriate public safety agency, usually over dedicated emergency trunks. Basic 911 networks are not capable of processing the caller's location, but simply forward all 911 calls to the appropriate public safety agency.

The "enhanced" service requires that VoIP providers route 911 calls through the use of a selective router to a geographically appropriate public safety agency based on the caller's location. Enhanced 911 also provides the call taker with the caller's call back number and, in many cases, location information. The order applied to providers that enable customers to receive calls from and terminate calls to a POTS. The order included the following:

- Interconnected VoIP providers must deliver all 9-1-1 calls to the customer's local emergency operator. This must be a standard, rather than optional, feature of the service.
- Interconnected VoIP providers must provide emergency operators with the call back number and location information of their customers when the emergency operator is capable of receiving it. Although the customer must provide the location information, the

VoIP provider must provide the customer a means of updating this information, whether he or she is at home or away from home.

- By the effective date, interconnected VoIP providers must inform their customers, both new and existing, of the enhanced 911 capabilities and limitations of their services.
- The incumbent local exchange carriers are required to provide access to their enhanced 911 networks to any requesting telecommunications carrier. They must continue to provide access to trunks, selective routers, and enhanced 911 databases to competing carriers. The FCC claimed it would closely monitor this obligation.

The FCC has repeatedly extended the deadline for VoIP providers to comply with its order. As of this writing, the FCC had set the compliance deadline at November 28, 2005. In October 2005, AT&T stated that it had developed a manner for complying with the order that would require its VoIP users to verify their location each time they initiate a connection for their service.

Congressional Debate Regarding VoIP

Notwithstanding all the activity in the judiciary and executive branches of the federal government, Congress also has been involved in the VoIP debate. Although lawmakers have proposed many different pieces of legislation that would revise the 1996 Telecommunications Act and regulate VoIP, the Committee on Energy and Commerce is currently drafting what may turn out to be an important piece of legislation. Over the summer of 2006, the Committee released its draft bill regarding VoIP for discussion purposes.³¹ The proposed legislation purports to:

- Create a common regulatory definition for broadband Internet transmission services (BITS), which includes DSL, cable modems, and other broadband services.
- Provide a uniform, federal regulatory framework for broadband providers, VoIP, and broadband video providers, except in some areas where state or local rules still apply, such as rights-of-way.
- Authorize the FCC to determine that VoIP can be required to contribute to the Universal Service Fund.
- Develop a streamlined franchising process for broadband video providers.
- Apply many current cable video requirements to broadband video providers.
- Allow municipalities to develop and deploy BITS, VoIP, and broadband video services.

- Municipalities cannot provide preferential treatment for these services, however, and must comply with all regulations governing private sector providers.
- Ensure that VoIP subscribers have access to 911.

Senators Inouye and Stevens, the authors of the bill, have touted this legislation as the comprehensive reform of the 1996 Telecommunications Act. Many Republicans on Capitol Hill face pressures from their state governments to keep the flow of locally collected telecommunication tariffs within their respective states. Thus, the passage of this bill anytime soon seems remote.

The very nature of VoIP makes local tariff collection a distortion of reality because VoIP's boundaries are not consistent with state or national physical borders. Furthermore, Universal Access is based on providing POTS service to rural and remote areas. This 75-year-old model has been effectively declared obsolete by the advent of VoIP, whereby even the poorest farmer in Appalachia has Internet access despite the absence of POTS or paved roads.

Challenges for Businesses Considering VoIP

The promise of VoIP for businesses is two-fold: (1) efficient convergence of voice and data communications with a unified system platform in which data transmissions, email and voicemail are easily electronically stored under one system; and (2) after initial installation, lower cost communications in which savings can be anywhere from 10 percent to 30 percent when compared to equivalent services offered by POTS providers.

The possibility of law enforcement agency interception of VoIP communications and the prospect that local or state public utility commissions will have the authority to impose the common carrier obligations and tariffs upon VoIP providers pose significant operational and economic concerns to businesses and individual consumers alike.

Companies considering deploying VoIP may need to modify records retention policies for compliance with government regulations concerning investigations or relating to particular industry protocols. For instance, the securities industry maintains very strict standards regarding the retention of voicemails and other communications received from customers because there are frequent challenges regarding execution of trades.

In light of the terrorist threats that this country faces, law enforcement agencies that are outside the scope of industry-specific regulatory bodies may also now impose their own regulations regarding retention of VoIP communications. This will inevitably require increased capacity for electronic storage beyond what may have been anticipated when the VoIP system was originally planned. Consequently, the costs of a VoIP system are bound to increase, possibly narrowing the gap between the cost and benefits of traditional POTS systems when compared to a VoIP system.

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Furthermore, workplace rules regarding employer monitoring of emails, voicemails, and Internet access have become a fertile ground for much employment law related litigation. Typically, courts have decided that outside of an employee's wages, an employee's voice-mails; emails, and navigation on the Internet, recorded through cookies, are the property of and subject to inspection of the employer. Employers are strongly advised to provide written notification to employees regarding these policies, however, prior to engaging in any kind of monitoring of telecommunication activity.

With the extension of CALEA to VoIP communications, companies and their employees will need to recognize and legal counsel will need to explain that inadvertent disclosures to law enforcement of data, document, and voice communications not related to the subject of a criminal investigation may occur. Therefore, the expectation-of-privacy standard articulated by Chief Justice Warren Burger in *Katz v. United States*,³³ may be modified under the FCC's CALEA ruling.

In addition, businesses will have to pay close attention regarding the debate over the funding of common carrier obligations. Future legislation could allow states to impose tariffs and taxes on VoIP providers for services such as 911 emergency calls, Universal Access, and access for disabled persons. These are the same common carrier obligations that are currently held by POTS providers. States are obviously very concerned that any dramatic shift in deployment from POTS systems to VoIP systems would decimate the coffers that pay for these services with no backup relief from the federal government.

On the other hand, VoIP providers decry such imposition of common carrier obligations by regulatory or statutory mandate because of the dramatic cost increase that would be imposed upon what is viewed as a nascent industry. Moreover, many critics fear that the taxation of VoIP would ultimately give rise to the taxation of Internet transactions or Internet access, as state, local, and federal government seek to find new sources of revenue.

These critics note that the Internet has grown dramatically not only due to freedom from government regulation but also to a large extent because it has been funded with government monies. As businesses decide how to upgrade their telecommunication abilities in response to the rapidly changing business climate created by the ever expanding reach of the Internet, they must carefully consider the costs attached to deploying a VoIP system and the various legal and regulatory concerns associated with VoIP.

Moreover, policy makers must recognize the amount of regulation or subsidization that was initially provided to other parts of the Internet enabling it to grow and flourish. It may still be too early to impose a regulatory paradigm on VoIP technology while it is still in

its infancy. Other aspects of the Internet may be better able to shoulder the cost of related government services.

Nevertheless, all these considerations must be part of any calculation by businesses and consumers alike implementing VoIP technology. Obviously, legal counsel for these businesses and individuals need to address these issues as well.

Conclusion

The future of VoIP is very promising, but is also filled with many uncertainties. As a practical matter, VoIP technology continues to develop rapidly. For instance, the development of the Internet has long contained a promise of video phones being available. With the implementation of VoIP technology, video telephone calls are now a reality within the grasp of businesses and consumers alike. Video phone units that require broadband access and constitute a form of VoIP are available from \$269 per unit to as much as \$599 a unit, depending on the features and specifications of the particular user.

The only drawback with these systems, at the moment, is that the units work only with each other and one brand's phones are not yet designed to integrate with another brand of video phone. So at least in the short-term, businesses are required to buy multiple units for branch offices, or individual consumers are required to buy sufficient units for family members, who are spread out among vast distances.

Another recent development concerns the adapter technology for linking or connecting a telephone device to a computer device for sending and receiving VoIP. Two leaders in home networking equipment, Netgear and Linksys (a division of Cisco Systems), recently announced plans to build phone jacks into wired and wireless equipment. The jacks are designed to provide an instant link to the commercial VoIP network developed by Vonage.

Furthermore, there are additional products from these companies that allow home system broadband routers to work with the VoIP phone jacks so that multiple computers within the home can participate and enjoy VoIP phone calls with a wireless configuration. Thus, one broadband connection can be shared by all PCs within a household for VoIP usage.

On the negative side, the advent of VoIP technology also means introducing new risks to the user. These risks include the interception of VoIP communications through industrial espionage or the theft of trade secrets transmitted over VoIP. Indeed, as companies seek to implement VoIP as part of wireless networks, the threat to interception by third parties other than law enforcement is very real. Developing proper network security protocols is a constant problem given the plethora of circumvention efforts by programming experts.

Audible spam over VoIP presents another problem. Because VoIP systems are grounded in the TCP/IP protocol of the Internet, the ability to design software programs that

make multiple phone calls with pre-programmed announcements and unsolicited sales offers already looms on the horizon and threatens to be as ubiquitous and pervasive as visual SPAM. on a computer screen. The development of VoIP SPAM filters and other related software protection products will no doubt follow. VoIP also creates an opportunity for designers of viruses to infect computer systems. Therefore, antivirus software will have to address this threat.

The promise of VoIP is great as it is a part of the apparently unlimited potential of the Internet and the World.